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16/ENG06/043

ENG 382

Assignment

Given $d = \alpha \beta^{t}$ — ①

Comparing eqn ① to $y = mx + c$

$\log d = \log \alpha + t \log \beta$

where; $a_0 = \log \alpha$

$a_1 = \log \beta$

	$y = \log d$	$t = x$	xy	$d(n)$	x^2	y^2
1)	0.30102999.6	0	0	0	0	0.09061905
2)	0.69897004	1	0.69897004	1	1	0.488559067
3)	1.27875360	2	2.557507202	2	4	1.635210172
4)	1.698970004	3	5.09691013	3	9	2.886499076
5)	2.178976947	4	8.715907789	4	16	4.747940537
6)	2.672097850	5	13.36048929	5	25	7.140106962
7)	3.156851901	6	18.94111142	6	36	9.965713925
8)	3.654369091	7	25.58058364	7	49	13.35441345
9)	4.111800007	8	32.89440006	8	64	16.9068993
10)	4.614463911	9	41.5269532	9	81	21.28997336
11	5.04540585	10	50.45405135	10	100	25.4611297

$\sum Y = 29.41133046$

$\sum x = 55$

$\sum xY = 199.8268839$

$\sum x^2 = 385$

$\sum y^2 = 103.9620485$

$\sum y^2 = a_0 N + a_1 \sum x$

$29.41133046 = a_0(11) + a_1(55)$

$\sum xy = a_0 \sum x + a_1 \sum x^2$

$1998268839 = a_0(55) + a_1(385)$ — ②

Solving eqn ① and eqn ②

$29.4113046 = 11a_0 + 55a_1$

$199.8268839 = 55a_0 + 385a_1$

$$a_0 = \frac{\begin{vmatrix} 29.41133046 & 55 \\ 199.5268839 & 385 \end{vmatrix}}{\begin{vmatrix} 11 & 55 \\ 55 & 385 \end{vmatrix}}$$

$$= \frac{(29.41133046)(385) - (55)(199.8268839)}{(11 \times 385) - (55 \times 55)}$$

$$a_0 = 0.27511$$

$$a_1 = \frac{\begin{vmatrix} 11 & 29.41133046 \\ 55 & 199.826835 \end{vmatrix}}{\begin{vmatrix} 11 & 55 \\ 55 & 385 \end{vmatrix}}$$

$$a_1 = \frac{(11 \times 199.8268835) - (29.44133046 \times 55)}{(11 \times 385) - (55 \times 55)}$$

$$a_1 = 0.47973$$

$a_0 = \log \alpha$

$0.27511 = \log \alpha$

$\alpha = 1.8841$

$a_1 = \log \beta$

$0.47973 = \log \beta$

$\beta = 30181$

$\alpha = 1.8841$

$\beta = 3.0181$

d.) Correlation co-efficient

$$R = \frac{N\Sigma XY - (\Sigma x)(\Sigma Y)}{\sqrt{N\Sigma x^2 - (\Sigma x^2)(N\Sigma x^2 - (\Sigma y)^2)}}$$

$$R = \frac{(11 \times 199.82688 39) - 55(29.41133046)}{\sqrt{(11 \times 385 - 55^2) \times [11 \times 103.9620485 - (29.44133046}}$$

$R = 0.9998448312$

$R_{square} = (0.99984 4312)^2$

$= 0.9996896864$

For manual method
$R = 0.999844 8312$
$R^2 = 0.99968988864$

For matlab;
$R = 0.9998$
$R^2 = 0.9997$

For excel,
$R = 0.99984483235763$
$R^2 = 0.999689688792257$

d) From observation for all the methods used to solve the correlation coefficient and its square, it can be seen that $R^2 < R$ i.e the value of the square of the correlation coefficient is lesser than the actual value of the correlation coefficient.